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## Intensification of experimental climate and nitrogen addition on the sensitivity of shrubland communities globally

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Increasing climate change and nitrogen deposition are altering vegetation structure and functioning globally, yet the changes in species diversity, vegetation cover and functioning of global shrublands to these environmental changes are not systematically quantified. We conducted a global meta-analysis to quantify the shrubland responses relating to plant cover and density, species diversity and shrub encroachment as well as the functions for the shrub communities across 77 study sites to experimental warming, precipitation shifts and nitrogen addition. A sensitivity index was applied to account for the net vegetation responses of these vegetation metrics to the simulated drivers and explore the associations with the site background climate and soil nutrient variables. We observe that all the metrics were vulnerable to the treatments, the sensitivity was negative for most vegetation metrics under drought. Few vegetation metrics had sensitivity differences for the temporal scales (short-term vs long-term) of manipulations and successional stages (mature vs disturbed communities). Vegetation sensitivities to the environmental variables were associated with the site background climate and soil nutrient availability. Given the increasing challenges for future climate and nitrogen enrichment, quantifying the patterns of shrubland sensitivity and exploring their correlations with the site water and soil nutrient availability have important implications for management strategies and conservation of global shrublands.